SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 7.—"On the Proteid Reaction of Adamkiewicz, with Contributions to the Chemistry of Glyoxylic Acid." By F. Gowland Hopkins, M.A., M.B, University Lecturer in Chemical Physiology, and Sydney W. Cole, B.A., Trinity College. (From the Physiological Laboratories, Cambridge.) Communicated by Dr. Langley, F.R.S.

The proteid reaction described by Adamkiewicz is not a furfurol reaction, but depends upon the presence of small quantities of an impurity in the acetic acid employed. Some specimens of acetic acid yield no reaction, and all may be deprived of chromogenic power by distillation.

The substance essential to the reaction is glyoxylic acid.

Small quantities of glyoxylic acid are produced during the oxidation of acetic acid by hydrogen peroxide in the presence of ferrous iron. Under the conditions used in this research, part of the glyoxylic acid thus formed is split up, yielding formaldehyde.

Glyoxylic acid is slowly formed when acetic acid stands in the air, and more rapidly in the presence of ferrous iron and under the influence of direct sunlight. Most specimens of acetic acid contain small amounts of glyoxylic acid as an admixture.

A dilute aqueous solution of glyoxylic acid, which may be readily prepared by the reduction of oxalic acid with sodium amalgam, forms an admirable test for proteids when used instead of acetic acid under the ordinary conditions of the Adamkiewicz test.

"Further Investigations on the Abnormal Outgrowths or Intumescences in *Hibiscus vitifolius*, Linn. : a Study in Experimental Plant Pathology." By Elizabeth Dale. Communicated by Prof. H. Marshall Ward, F.R.S.

The conclusions drawn from the experiments are that the outgrowths are formed in a moist atmosphere, provided that there is also adequate light and heat.

The immediate effect of the damp atmosphere is to check transpiration. This, in its turn, by blocking the tissues with water, disturbs the normal course of metabolism, and so leads (when the light and heat are sufficient) to changes in the metabolic activity of the plant, as is shown by the following facts : —

(1) The outgrowths only develop if transpiration is reduced.

(2) The outgrowths are chiefly formed on organs which are actively assimilating, *e.g.* under ordinary red or yellow glass ; but only if transpiratory activity is lowered : they are not formed in the open.

(3) They only occur (*ceteris paribus*) in plants in which there is an accumulation of starch.

(4) They are formed under clear glass and under red and yellow glass, but not under blue or green glass, and in no case in darkness.

(5) Their formation is accompanied by the production of oil, which is not found in normal leaves.

(6) The presence of this oil suggests that events similar to those occurring in succulent plants are taking place, viz., reduced respiration and the development of osmotically active substances in excess.

(7) It is therefore probable that the intumescences are due to the local accumulation of osmotically active substances, produced under the abnormal conditions, viz., reduced transpiration and consequent lack of minerals, while carbohydrates are being developed in excess.

Physical Society, February 8.—Annual General Meeting. Mr. G. Griffith, Vice-president, in the chair. The report of the council was read and adopted. Prof. Willard Gibbs and Dr. Rudolph Koenig were elected to the two vacant honorary fellowships of the Society. The following officers and council were elected for the ensuing year :—President : Prof. S. P. Thompson. Vice-presidents (members who have filled the office of president) : T. H. Blakesley, C. V. Boys, Prof. J. D. Everett and J. Walker. Secretaries : H. M. Elder and W. Watson. Foreign Secretary : Dr. R. T. Glazebrook. Treasurer : Prof. H. L. Callendar. Librarian : W. Watson. Other members of the Council : Prof. Armstrong, W. R. Cooper, G. Griffith, E. H. Griffiths, Dr. R. A. Lehfeldt. S. Lupton, Prof. Perry, Dr. Porter, W. A. Price and R. Threlfall.—Prof. S. P. Thompson then took the chair and delivered an address. In opening, the President gave in detail the various ways in which the aim of the Physical Society to promote the progress and study of physics has been accomplished during the twenty-six years of the Society's existence. Referring to the election of two honorary fellows, Prof. Thompson said they had added to their roll two men distinguished in very different walks of physics. Prof. Willard Gibbs is a United States mathematical physicist whose work in thermodynamics, elastic solid theory of light and other specialised subjects is of the highest order and is valued for its beauty and profundity. Dr. Rudolph Koenig, of Paris, is known as a maker of acoustical instruments—of perfect standard, tuning-forks in particular. He has, however, found time to extend the borders of acoustics, and to him we owe the manometric flames, the wave syren and other instruments of research. He has also published work on the facts about the combinations of pure tones. The President appealed to all teachers of physics in the country to make use of the Society and give it their active support. It was mainly in the interest of teachers and students that the Society undertook the publication of science abstracts. By means of the abstracts teachers have at hand the latest information on the subject, and can thus continually supplement their text-book knowledge. Every teacher, from time to time, devises new or improved modes of presenting his subject. At the Physical Society the Fellows always welcome contributions of this kind, even though there may be little of actual novelty in the principles so illustrated. The routine work and administrative duties of teachers, although hampering their usefulness to science and diminishing their fruitfulness, prevent their attention, without intermission, to one subject and produce a direction of thought over varions domains of physics which is to be welcomed rather than deplored. It has been the custom for Fellows of the Physical Society to bring models to illustrate physical principles. This practice of using models is regarded by our Continental brethren as a peculiarly English matter and one that shows a sort of mental constitution they do not quite understand. Models have become a part of our mental furniture. It never occurs to us that there is anything unusual in the habit. Faraday has used them in connection with the electrostatic field surrounding charged bodies. Lord Kelvin has made models to convey his ideas of elasticity, of the elastic solid theory of matter and of the constitution of matter itself. Maxwell's models of heterogeneous dielectrics and the mutual induction between two circuits are well known. These models are useful for teaching purposes and for enabling one to grasp that which in its nature is abstract by contemplating the representation of it or its analogue in the concrete. The French physicist cannot understand a complicated phenomenon until he has reduced it to a mathematical equation. The British physicist must construct a model which will produce mechanically the analogous operation. Both methods are right, but judging by their fruitfulness the method of Faraday has advantages over that of Poisson. Referring to the New Teaching University of London, the President said that now was the time for Fellows to offer suggestions for the teaching of physics.—An ordinary meeting of the Society was then held.—A paper on a mica echelon grating, by Prof. R. W. Wood, was read by Mr. Watson. This grating occupies a position midway between an ordinary grating and an echelon with thick plates. A number of sheets of mica were examined with the interferometer and one selected, over a considerable portion of which the fringes were straight and unbroken. This portion was marked off and cut up into rectangles. The mica was about 0·05 mm. thick, and the retardation of one of the rectangles was found to be fifty wave-lengths for sodium light. Nine of these rectangles were used to form the grating, and they were put in position under a microscope and cemented together at the edges with sealing wax. The grating space was 0·5 mm. The battery was mounted on a square of cardboard over a rectangular opening of the same size, a clear space 0·5 mm. wide being left to serve as the first grating line of zero retardation. The number of lines was therefore ten. The resolution of the sodium lines was beyond the power of the instrument, but the yellow mercury lines were easily separated. The distance between the lines was one-third of the distance between the spectra. For the sake of comparison, a grating of the same spacing and number of lines was ruled on a piece of smoked glass, and it was found that in the first order the grating was unable to separate the extreme red and blue ends of the spectrum. The Zeeman effect can be shown with an echelon made of four interferometer plates, the light being the green rays from a mercury tube. The Society then adjourned until February 22.

EDINBURGH.

Royal Society, January 21.—Lord Kelvin, President, in the chair.—The Chairman communicated a paper on one-dimensional illustrations of the kinetic theory of gases, in the course of which he referred to Waterston's doctrine of the partition of energy among molecules of different size, a doctrine which, although supported by Maxwell, Boltzmann and others, he believed to be not only not proved but not true. If the doctrine is found to fail in one particular case, its universality is disproved. By considering the impacts among a row of hard elastic spheres constrained to move to and fro in the same straight line, he had, by direct calculation of the effects of 300 successive collisions, found no tendency towards a state in which the average energy of *all* the masses was the same. When the time of impact was assumed to be infinitely short, so that no more than two spheres could be in contact at the same time, the calculation was simple enough; but the problem quite changed its character when the time of impact was taken as finite, so that three or more particles might be in contact at the same time. It was shown that impenetrability was not a necessary quality of molecules. If we follow Boscovich and regard them as centres of force, then two molecules might, on collision, simply pass through one another.—Dr. Knott read the first part of a paper on solar radiation and earth temperatures, in which a comparison was made between two sets of data, the one derived from Langley's well-known results, the other from a recent discussion by Dr. Buchan of temperature observations made at various depths in the eastern part of the Mediterranean Sea by the Austrian ship *Pola*. These seemed to indicate a daily see-saw of temperature in a stratum of surface water 50 metres thick. It was difficult to credit direct solar radiation with the power to penetrate so deep; but the difficulty was greatly increased when a simple calculation showed that the afternoon excess of temperature which was indicated meant an accumulation of 1460 units of heat under each square centimetre of surface during eight hours of daily sunshine. For, with Langley's value of the solar constant, it could be calculated that the *whole solar energy supplied* to each square centimetre of the earth's surface in the latitude of the Mediterranean during eight hours of the midsummer day did not exceed 750 units. This serious discrepancy seemed impossible of explanation if the general accuracy of both sets of data was assumed.—Dr. Thomas Muir communicated three papers, namely, note on pairs of consecutive integers the sum of whose squares is an integral square; the differentiation of a continuant; and the Hessian of a general determinant. By direct calculation of the various elements, it was shown that the Hessian of the determinant D of the nth order had the value $\pm(n-1)D^{n(n-2)}$.

PARIS.

Academy of Sciences, February 4.—M. Fouqué in the chair.—Notice on M. Agardh, by M. Bornet.—On the origins of chemical combination. The allotropic states of silver, by M. Berthelot. The method employed is to measure the amount of heat developed by the various allotropic modifications of silver when dissolved in mercury. The five kinds of silver employed gave for 108 grams of the metal amounts of heat varying between 0·08 calorie and 2·03 calories. The values previously obtained for the heats of combination of silver with other elements depend, therefore, upon the state of the metal used, and hence require a correction.—Studies on the combinations of silver with mercury, by M. Berthelot.—On the isentropic stability of a fluid, by M. P. Duhem.—A simple apparatus for the application of the phototherapic method of Finsen, by MM. Lortet and Genoud. The rays from an arc lamp are concentrated by means of a globular flask, through which cold water is kept running. The greater part of the heat is absorbed by the water in the lens, and the apparatus has given good results in actual clinical practice.—Remark on the subject of a note by M. S. Kantor, by M. F. Enriques.—On pencils which are transformed on two sides into orthogonal pencils by the method of Laplace, by M. C. Guichard.—On the density of the zeros and the maximum modulus of a complete function, by M. Pierre Boutroux.—On the relation between the solar activity and the diurnal variation of the magnetic declination, by M. Alfred Angot. This problem has been attacked by applying the method of Fourier to the observations of Paris and Greenwich, the values for the constants obtained in the two cases agreeing very well.—On the borates of magnesium and the metals of the alkaline earths, by M. L. Ouvrard. By heating to a dull red heat a mixture of magnesia, boric anhydride and potassium hydrogen fluoride, the borate $B_2O_3,3MgO$ is obtained in a well crystallised state. The corresponding compounds of barium, strontium and calcium were also isolated.—On the electrolysis of the oxy-acids Preparation of β-amyloxypropionic acid and of the diamyline of butanediol, by M. l'abbe J. Hamonet. To prevent the occurrence of secondary reactions with the hydroxyl group, the hydrogen of this group was replaced by an alkyl group, and the potassium salt of this compound electrolysed. No satisfactory results were obtained with α-oxy-acids, but with β-oxy-acids the synthesis was smoothly effected in the required direction.—On the saccharifying action of wheat germs, and on their use in brewing, by M. Lindet. Owing to the extensive use of roller milling, the germ of the wheat is entirely separated from the farinaceous portion of the grain. A comparative study of the action of wheat germs and malt upon a solution of dextrinised starch showed that practically the same amount of sugar was produced in each case. In the case where the wheat germs are employed, the distillery residues will have a higher feeding value.—The legend of *Lepas anatifera*, and of *Vallisneria spiralis*, by M. Frédéric Houssay.—The *Ramy* of Madagascar, by M. H. Jacob de Cordemoy. The author identifies the *Ramy* of Madagascar with *Canarium multiflorum*. This tree exudes a greenish-yellow resin which is formed in the stem in resinous canals which are specially developed in the liberian tissue.—On a new genus of fossil stem, by M. B. Renault. The fragment of stem described was found in a dolmen of Haute-Alsace. It is named *Adelophyton julieri*.—On the presence of a layer of Devonian anthracite at Kouitcheou in China, by M. G. H. Monod The fossils found in the coal-measures at Lan-mou-tchang, in Koui-tcheou, and in the neighbouring strata show that these are clearly Devonian. This field shows that the vertical extension of the coal in China is greater than had been supposed, and this extension ought to be still further increased.—The culture and reproduction of the salmon (*Salmo salar*) in fresh water, by M. Jousset de Bellesme. The experiments described prove that the culture and reproduction of the salmon is possible in fresh water exclusively. This gives rise to the belief that although the habit of going to the sea is favourable to its development, it is neither very ancient nor absolutely necessary to its reproduction.—On the constitution of the soil at great oceanic depths, by M. J. Thoulet. As a result of the study of sixty specimens taken at various depths by the Prince of Monaco, the views previously put forward by the author are confirmed.—On a small laboratory furnace, by M. Albery Bruno.

ST. LOUIS.

Academy of Science, December 17, 1900.—Dr. O. Widmann read an account of the great St. Louis crow-roost, in which were embodied many facts concerning the life-history and habits of the common crow.—Prof. F. E. Nipher gave an account of some of his recent results in positive photography. He has now found that hydrochinone baths of normal strength may be used. The formula given in each box of Cramer plates yields good results if the mixed bath is diluted with water to one-third strength. The potassium bromide may be left out, and one drop of concentrated hypo-solution must be added for each ounce of diluted bath. The hypo has a most wonderful effect. With the same bath, plates may be developed as positives in the dark room or in direct sunlight. He had even started the developing of a plate in a dark room, where it progressed very slowly, but very satisfactorily; continued the operation in diffused daylight in an adjoining room, and finished the operation in direct sunlight. The process was accelerated by the light, but did not appear to be otherwise changed by the change in illumination. The resulting picture could not be distinguished from those produced by ordinary methods. This picture was shown by means of the lantern. A box of Cramer's "Crown," "Banner" or "Isochromatic" plates may have the plates individually wrapped in black paper, in the dark room or at night, and all the remaining work may be done in the light. A plate is taken from its wrapping into the lighted room and placed in the slide holder. After exposure, it is taken out into the light and placed in the developing bath, and the picture is then developed in the light, and may be fixed in the light. Of course, during the changes the plate should be shielded from the light as much as possible, and the fixing bath may always be covered. But all of the operations may be carried on without any dark-room conveniences that may not be secured even in the open fields. When weak hydrochinone baths are used, the picture, when developed in strong lamp-light, or in sunlight, has at first a golden yellow colour. When left in the lighted bath for an hour

and a half, it slowly darkens to a nearly normal shade, as the details come out more sharply. If the exposure has been correctly made, there will be no trace of fog. With stronger baths the picture comes out in the normal time, and has the normal shade. If the pictures are too dense, the remedy is to reduce the strength of the sodium carbonate solution, or to increase the amount of hypo in the bath. Very fine results are obtained with the sodium carbonate solution at half the strength given in Cramer's formula. When the plate has been sufficiently exposed, a negative of the object can usually be seen upon the plate before development. With long exposure this image is very distinct. It fades out in the bath, and the plate becomes clear. The shadows appear strongly, but indistinctly at first, and of a pink colour, and the high-lights still appear white. The solution remains clear. Too much hypo will cause turbidity and a loss of detail. When the plate is exposed in a printing frame under either a negative or a positive, an exposure of half a minute to diffuse daylight is ample with an ordinary negative. The plate may be over-exposed by placing it for a long time in direct sunlight, and it will then appear on development somewhat like an over-exposed negative. This has not yet been tried with hypo in the bath. Prof. Nipher showed a preliminary diagram, in which exposure and illumination of the developing bath were taken as co-ordinates. The zero condition was represented by a line, and the conditions for producing direct and inverted pictures were represented by areas. He also exposed and developed, in a common bath, in the lighted audience room, negatives printed from negatives, and positives printed from positives. The possible value of radio-active substances acting upon the developing plate in place of, or in addition to, light, was referred to as a most promising field for study.

DIARY OF SOCIETIES.

THURSDAY, FEBRUARY 14.

ROYAL SOCIETY, at 4.30.—Some Additional Notes on the Orientation of Greek Temples, being the Result of a Journey to Greece and Sicily in April and May, 1900: F. C. Penrose, F.R.S.—The Transmission of the *Trypanosoma Evansi* by Horse Flies, and other Experiments pointing to the Probable Identity of Surra of India and Nagana or Tsetse Fly Disease of Africa: Dr. Leonard Rogers.—On the Influence of Ozone on the Vitality of some Pathogenic and other Bacteria: Dr. A. Ransome, F.R.S., and A. G. R. Foulerton.—On the Functions of the Bile as a Solvent: B. Moore and W. H. Parker.—To be read *in title only*: On the Application of the Kinetic Theory of Gases to the Electric, Magnetic and Optical Properties of Diatomic Gases: G. W. Walker.—Heredity, Differentiation, and other Conceptions of Biology: a Consideration of Prof. Karl Pearson's paper "On the Principle of Homotyposis": W. Bateson, F.R.S.

MATHEMATICAL SOCIETY, at 5.30.—The Distribution of Velocity and the Equations of the Stream Lines, due to the Motion of an Ellipsoid in Fluid Frictionless and Viscous: T. Stuart.—On Factorisable Twin Binomials: Lieut.-Colonel Cunningham, R.E.—Concerning the Abelian and Related Linear Groups: Prof. L. E. Dickson.—A Geometrical Theory of Differential Equations of the First and Second Orders: R. W. Hudson.—Brocardal Properties of some Associated Triangles: R. Tucker.—A Note on Stability, with a Hydrodynamical Application: T. J. I'a. Bromwich.

SOCIETY OF ARTS (Indian Section), at 4.30.—The Greek Retreat from India: Colonel Sir Thomas H. Holdich, K.C.I.E.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Capacity in Alternate Current Working: W. M. Mordey. (Adjourned Discussion.)

FRIDAY, FEBRUARY 15.

ROYAL INSTITUTION, at 9.—Electric Waves: Right Rev. Monsignor Gerald Molloy.

GEOLOGICAL SOCIETY, at 3.—Annual General Meeting.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Light Lathes and Screw Machines: J. Ashford.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—The Epidemiological Aspects of Isolation Hospitals: Dr. Arthur Newsholme.

MONDAY, FEBRUARY 18.

ROYAL INSTITUTION, at 3.—Origin of Vertebrate Animals: Dr. Arthur Willey.

SOCIETY OF ARTS, at 8.—The Bearings of Geometry on the Chemistry of Fermentation: W. J. Pope.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—Discussion on the Occurrence and Detection of Arsenic in Manufactured Products.

VICTORIA INSTITUTE, at 4.30.—The Wahabies: S. M. Zwemer.

TUESDAY, FEBRUARY 19.

ROYAL INSTITUTION, at 3.—Practical Mechanics: Prof. J. A. Ewing, F.R.S.

ZOOLOGICAL SOCIETY, at 8.30.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Nilgiri Mountain-Railway: W. J. Weightman.

ROYAL STATISTICAL SOCIETY (St. Martin's Town Hall, W.C.), at 5.30.—The Growth of Municipal and National Expenditure: The Right Hon. Lord Avebury, F.R.S.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—Imitative *versus* Creative—a Comparison: W. Edwin Tindall.

WEDNESDAY, FEBRUARY 20.

SOCIETY OF ARTS, at 8.—Some Features of Railway Travelling, Past and Present: Frederick McDermott.

GEOLOGICAL SOCIETY, at 8.—Submerged Valleys opposite the Mouth of the River Congo and of Western Europe: Prof. E. Hull, F.R.S.—The Geological Succession of the Beds below the Millstone Grit Series of Pendle Hill and their Equivalents in other Districts in England: Dr. Wheelton Hind and J. Allen Howe.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Report on the Phenological Observations for 1900: E. Mawley.—A Review of Past Severe Winters in England, with Deductions therefrom: Albert E. Watson.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Bacteria and Blood Parasites: C. Beck.

THURSDAY, FEBRUARY 21.

ROYAL SOCIETY, at 4.30.

LINNEAN SOCIETY, at 8.—On the Affinities of *Æluropus melanoleucus*, Alph. Milne-Edw.: Prof. E. Ray Lankester, F.R.S., and R. Lydekker, F.R.S.—Étude d'une espèce nouvelle de Lépapèdes: M. A. Gruvel.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—If the discussion on Mr. Mordey's paper is closed, the following paper will be read:—The Electrical Power Bill of 1900: Before and After: W. L. Madgen.

CHEMICAL SOCIETY, at 8.—(1) Isomeric Hydrindamine Mandelates and Phenylchloracethydrindamides; (2) Isomeric Benzylhydrindamine bromocamphorsulphonates and some Salts of *d-l*-Hydrindamine: F. Stanley Kipping and H. Hall.—Condensation of Phenols with Esters of the Acetylene Series. IV. Benzo-γ-pyrone and its Homologues: S. Ruhemann and H. W. Bausor.—Constitution of Bromocamphoric Anhydride and Camphanic Acid: A. Lapworth and W. H. Lenton.—The Action of Acetylchlor- and Acetylbrom-aminobenzenes on Amines and Phenyl hydrazine: F. D. Chattaway and K. J. P. Orton.

FRIDAY, FEBRUARY 22.

ROYAL INSTITUTION, at 9.—Metals as Fuel: Sir W. Roberts-Austen, F.R.S.

PHYSICAL SOCIETY, at 5.—How Air subjected to X-Rays loses its Discharging Property, and how it Discharges Electricity: Prof. Emilio Villari.—(1) On the Propagation of Cusped Waves and their Relation to the Primary and Secondary Focal Lines; (2) On Cyanine Prisms, and a New Method of Exhibiting Anomalous Dispersion: Prof. R. W. Wood.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Automatic Coupling: J. L. Cridlan.

SATURDAY, FEBRUARY 23.

ROYAL INSTITUTION, at 3.—Sound and Vibrations: Lord Rayleigh, F.R.S.

ESSEX FIELD CLUB (Essex Museum of Natural History Stratford), at 6.30.—Recent Work in Molluscan Morphology: Prof. G. B. Howes, F.R.S.

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